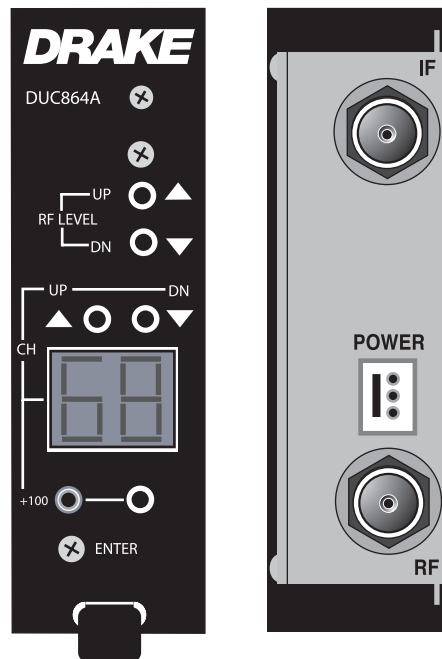


DUC864A

Digital Up-Converter

INSTRUCTION MANUAL



Model	Item #	Description
DUC864A	1002387A	Digital Up-Converter

800-523-6049
www.rldrake.com

Caution Statements

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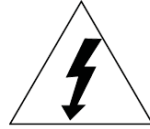
WARNING: TO PREVENT FIRE OR ELECTRICAL SHOCK, DO NOT EXPOSE TO RAIN OR MOISTURE.



A product and cart combination should be moved with care.



Quick stops, excessive force and uneven surfaces may cause the product and cart combination to overturn.

The lightning flash with arrow head symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.



	CAUTION RISK OF ELECTRIC SHOCK DO NOT OPEN	
CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER. NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL		

WARNING: THE SOCKET-OUTLET SHALL BE INSTALLED NEAR THE EQUIPMENT AND SHALL BE EASILY ACCESSIBLE.

WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS PRODUCT TO RAIN OR MOISTURE. DO NOT OPEN THE CABINET, REFER SERVICING TO QUALIFIED PERSONNEL ONLY.

CAUTION: TO PREVENT ELECTRIC SHOCK, DO NOT USE THIS (POLARIZED) PLUG WITH AN EXTENSION CORD RECEPTACLE OR OTHER OUTLET UNLESS THE BLADES CAN BE FULLY INSERTED TO PREVENT BLADE EXPOSURE.

ATTENTION: POUR PREVENIR LES CHOCS ELECTRIQUES, NE PAS UTILISER CETTE FICHE POLARISEE AVEC UN PROLONGATEUR, UNE PRISE DE COURANT OU UNE AUTRE SORTIE DE COURANT, SAUF SI LES LAMES PEUVENT ETRE INSEREES A FOND SANS EN LAISSER AUCUNE PARTIE A DECOUVERT.

Important Safety Instructions

- 1. Read Instructions:** All the safety and operating instructions should be read before the product is operated.
- 2. Retain Instructions:** The safety and operating instructions should be retained for future reference.
- 3. Heed Warnings:** All warnings on the product and in the operating instructions should be adhered to.
- 4. Follow Instructions:** All operating and use instructions should be followed.
- 5. Cleaning:** Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleansers. Use a damp cloth for cleaning.
- 6. Attachments:** Do not use attachments that are not recommended by the product manufacturer as they may cause hazards.
- 7. Water and Moisture:** Do not use this product near water—for example, near a bathtub, wash bowl, kitchen sink or laundry tub; in a wet basement; or near a swimming pool; and the like.
- 8. Accessories:** Do not place this product on an unstable cart, stand, tripod, bracket, or table. The product may fall, causing serious injury to a child or adult, and serious damage to the product. Use only with a cart, stand, tripod, bracket, or table recommended by the manufacturer, or sold with the product. Any mounting of the product should follow the manufacturer's instructions, and should use a mounting accessory recommended by the manufacturer.
- 9.** A product and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the product and cart combination to overturn.
- 10. Ventilation:** Slots and openings in the cabinet are provided for ventilation and to ensure reliable operation of the product and to protect it from overheating, and these openings must not be blocked or covered. The openings should never be blocked by placing the product on a bed, sofa, rug, or similar surface. This product should not be placed in a built-in installation such as bookcase or rack unless proper ventilation is provided or the manufacturer's instructions have been adhered to.
- 11. Power Sources:** This product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supplied to your home, consult your product dealer or local power company. For products intended to operate from battery power, or other sources, refer to the product's operating instructions.
- 12. Grounding or Polarization:** This product may be equipped with a polarized alternating-current line plug (a plug having one blade wider than the other). This plug will fit into the power outlet only one way. This is a safety feature. If you are unable to insert the plug fully into the outlet, try reversing the plug. If the plug should still fail to fit, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the polarized plug. Alternate Warnings – If this product is equipped with a three-wire grounding-type plug, a plug having a third (grounding) pin, the plug will only fit into a grounding-type power outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the grounding-type plug.

Safety Instructions continued...

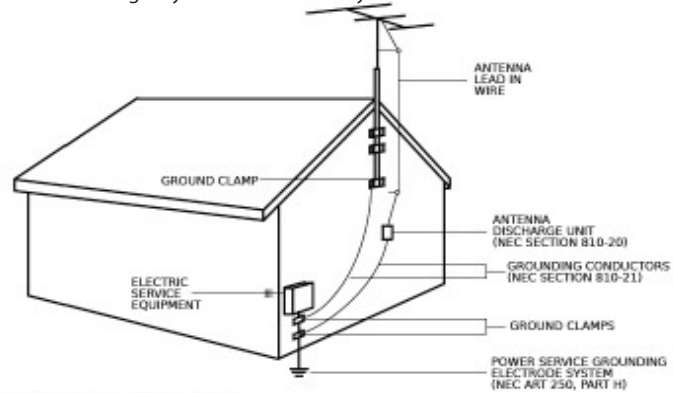
13. **Outdoor Antenna Grounding:** If an outside antenna or cable system is connected to the product, be sure the antenna or cable system is grounded so as to provide some protection against voltage surges and built-up static charges. Article 810 of the National Electrical Code, ANSI/NFPA 70, provides information with regard to proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna-discharge unit, connection to grounding electrodes, and requirements for the grounding electrode.
14. **Power-Cord Protection:** Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the product.
15. **Lightning:** For added protection for this product during a lightning storm, or when it is left unattended and unused for long periods of time, unplug it from the wall outlet and disconnect the antenna or cable system. This will prevent damage to the product due to lightning and power-line surges.
16. **Power Lines:** An outside antenna system should not be located in the vicinity of overhead power lines, other electric light or power circuits, where it can fall into such power lines or circuits. When installing an outside antenna system, extreme care should be taken to keep from touching such power lines or circuits as contact with them may be fatal.
17. **Overloading:** Do not overload wall outlets, extension cords, or integral convenience receptacles as this can result in a risk of fire or electric shock.
18. **Object and Liquid Entry:** Never push objects of any kind into this product through openings as they may touch dangerous voltage points or short-out parts that could result in a fire or electric shock. Never spill liquid of any kind on the product.
19. **Servicing:** Do not attempt to service this product yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.
20. **Damage Requiring Service:** Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
 - a) When the power-supply cord or plug is damaged,
 - b) If liquid has been spilled, or objects have fallen into the product,
 - c) If the product has been exposed to rain or water,
 - d) If the product does not operate normally by following the operating instructions.

Adjust only those controls that are covered by the operating instructions as an improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation, e. If the product has been dropped or damaged in any way, and f. When the product exhibits a distinct change in performance—this indicates a need for service.

21. **Replacement Parts:** When replacement parts are required, be sure the service technician has used replacement parts specified by the manufacturer or have the same characteristics as the original part. Unauthorized substitutes may result in fire, electric shock or other hazards.
22. **Safety Check:** Upon completion of any service or repairs to this product, ask the service technician to perform safety checks to determine that the product is in proper operating condition.
23. **Wall or Ceiling Mounting:** The product should be mounted to a wall or ceiling only as recommended by the manufacturer.

NOTE TO CABLE INSTALLER:

THIS REMINDER IS PROVIDED TO CALL THE CATV SYSTEM INSTALLER'S ATTENTION TO ARTICLE 820-40 OF THE NEC THAT PROVIDES GUIDELINES FOR PROPER GROUNDING AND, IN PARTICULAR, SPECIFIES THAT THE CABLE GROUND SHALL BE CONNECTED TO THE GROUNDING SYSTEM OF THE BUILDING, AS CLOSE TO THE POINT OF CABLE ENTRY AS PRACTICAL.



NEC = NATIONAL ELECTRIC CODE

Example of antenna grounding as per National Electrical Code, ANSI/NFPA 70

General Description and Specifications

The R.L. Drake DUC864A is a low noise upconverter used to translate the 44 MHz digital IF signal from a QAM or VSB modulator, DDC downconverter, or other similar equipment to the desired CATV or off-air output channel. A single model covers the entire 54 to 860 MHz output range. The DUC864A features low phase noise and can be used for QAM modulation up to 256 QAM. This module can be rack mounted using the RMM4 or RMM12 rack mount. The PSM 121 or PSM 125 power supply module is required with the RMM12 (the PSM 125 provides full 12 slot capability).

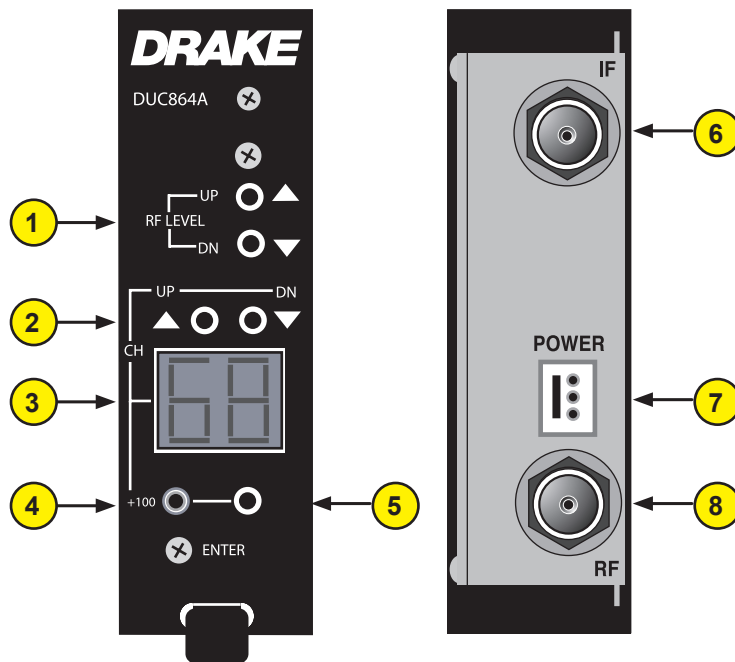
NOTE: The PS8 power supply requires an adapter part # 525148600A to power the DUC864A.

IF Input Level:	+30 dBmV
Output Frequency Range:	Standard CATV, IRC, HRC & Broadcast 54-864 MHz
RF Output Level Digital:	+45 dBmV*
Display Error:	±2 dB
Output Level Adjustment Range:	+35 to +45 dBmV
Spurious Output (54-864 MHz):	-60 dBc
Phase Noise @ 10 kHz Offset:	-95 dBc/Hz
Broadband Noise; Out of Channel:	-70 dBc (5.5 MHz BW)
Power Requirement:	310 mA @ +12 VDC, 320 mA @ +5 VDC

*Average Measurement

Specifications, price, and availability are subject to change without notice or obligation.

Front and Rear Panel Operation



FRONT PANEL

- 1. Up/Down RF Level Buttons:** Up & down push button controls for RF level
- 2. Up/Down Channel Buttons:** Up & down push button controls for channel and mode adjustment
- 3. 2-Digit LED Display:** 2 digit LED display for Channel, mode and RF level information
- 4. +100 Channel LED Indicator:** LED illuminates to indicate CATV channels 100 to 135
- 5. Enter Button:** Used to “enter” channel, mode or RF level selection into memory

REAR PANEL

- 6. IF Input:** “F” Connector
- 7. Power Connector**
- 8. RF Output:** “F” Connector

Setting Up the Unit

1. Place the units into the appropriate Drake micro-modular chassis by sliding the unit into the retaining rails.
 - a. It is recommended to physically place one Down-converter and one up-converter next to one another in the chassis, if applicable in your installation.
2. Connect the IF source, typically from a DDC864A down-converter to the IF 'F' connector of the DUC864A.
3. Connect the RF 'F' connector of the DUC864A to the appropriate combining device.
4. Connect to the power supply using one of the power supply cables.

Programming the Unit

The DUC864A unit is intended to accept any digital IF signal and process it to any channel from 54-864 MHz. The unit has 4 valid operating modes, STD CATV, IRC, HRC & Broadcast UHF/VHF. It comes factory set to operate in Standard CATV Mode. If you wish to change the operating mode skip to the Operating Mode Selection section.

PROGRAMMING A CHANNEL

1. Navigate to the desired channel number by depressing the CH ▲ UP and ▼ DN buttons.
 - a. Continue past 99 for channels 100-135, the +100 LED will illuminate.
 - b. Press and hold the CH ▲ UP or ▼ DN arrow button for fast scrolling.
2. Press the ENTER button when you reach the desired channel setting. This will tune the up-converter output to the corresponding frequency for this entry.
 - a. The LED display will blink continuously during the channel programming process and will not change the output channel until the ENTER button is depressed.
 - b. The unit has a special feature that alerts an operator of an inadvertent or desired change to the unit by flashing LED readout. The LED will continue to flash for 30 seconds if the ENTER button is not depressed and if no additional entries are made then the readout will return to the display of the previously programmed channel entry setting.

PROGRAMMING RF LEVEL

1. Depress the RF Level ▲ UP or ▼ DN buttons to increment or decrement the RF output level to the desired setting.
 - a. The unit has a specified adjustment range of +35 dBmV to +45 dBmV output. The unit software however, will permit entries from +33 to +47 dBmV, the out of range entries of 33-34 & 46-47 dBmV are meant for usage to correct any display error, allowing the unit to be operated in the specified range.

ATTENTION: It is also recommended to set the output level to +45 dBmV for optimum noise performance and externally attenuate down to a desired level.

2. Press the ENTER button when you reach the desired channel setting. This will tune the up-converter output to the corresponding frequency for this entry.
 - a. The LED display readout will also flash continuously during the RF Level programming process. The LED display will continue to flash for 30 seconds if the ENTER button is not depressed and then will return to the display of the previously programmed channel entry setting.

Operating Mode Selection

The unit has 4 valid operating modes: STD CATV, IRC, HRC & Broadcast UHF/VHF. The DUC864A unit comes factory set to operate in the Standard CATV mode.

TO CHANGE THE OPERATING MODE

1. Simultaneously depress the RF Level ▲ UP or ▼ DN buttons for approximately 5 seconds.
2. The Channel LED display will switch to the operating mode selection.
3. Use the RF Level ▲ UP or ▼ DN buttons to select the desired mode:
 - a. C = STD CATV
 - b. H = HRC
 - c. I = IRC
 - d. U = Broadcast (VHF/UHF)
4. After selecting the desired mode depress the ENTER button to set the mode.
5. The unit will return to the channel display mode.
 - a. Programming will reflect the mode chosen – See Appendix for detailed frequency plans.
 - b. The operating mode will also flash continuously during the mode selection process. The LED display will continue to flash for 30 seconds if the ENTER button is not depressed and then will return to the display of the previously programmed channel & mode entry setting.

NOTE: The mode presently in memory will be displayed without flashing during the mode selection process.

TROUBLESHOOTING	CORRECT SUGGESTION
<p>A continuously flashing Channel Display indicates an Error Condition detected by the unit microcontroller.</p> <p>Sample conditions include:</p> <ul style="list-style-type: none">• Channel Selector Entry does not match the channel number on which the unit is operating, the display will flash for 30 seconds and then revert back to the previous CH entry• E1 is displayed if the Input VCO is Not Locked• E2 is displayed if the Output VCO is Not Locked	<p>The User should perform the following steps to correct an Error Condition:</p> <ol style="list-style-type: none">1. Check that the Channel Display is set to the desired channel & reset as appropriate.2. Check that the unit is set to the appropriate desired operating mode.3. Verify the unit output on a spectrum analyzer.4. Disconnect and reconnect power to the unit. <p>If an error condition continues to be displayed, unit should be replaced and serviced.</p>

Appendix A

Output Center Frequencies

VHF Broadcast Channels	
Channel	(MHz)
2	57
3	63
4	69
5	79
6	85
7	177
8	183
9	189
10	195
11	201
12	207
13	213
UHF Broadcast Channels	
Channel	(MHz)
14	473
15	479
16	485
17	491
18	497
19	503
20	509
21	515
22	521
23	527
24	533
25	539
26	545
27	551
28	557
29	563
30	569
31	575
32	581
33	587
34	593
35	599
36	605
37	611
38	617
39	623
40	629
41	635
42	641
43	647
44	653
45	659
46	665
47	671
48	677
49	683
50	689
51	695
52	701
53	707
54	713
55	719
56	725
57	731
58	737
59	743
60	749
61	755
62	761
63	767
64	773
65	779
66	785
67	791
68	797
69	803

Appendix B

Output Center Frequencies

EIA Chan.	Standard CATV	Incremental (IRC)	Harmonic (HRC)
2	57	57	55.75
3	63	63	61.75
4	69	69	67.75
1		75	73.75
5	79	81	79.75
6	85	87	85.75
95	93	93	91.75
96	99	99	97.75
97	105	105	103.75
98	111	111	109.75
99	117	117	115.75
14	123	123	121.75
15	129	129	127.75
16	135	135	133.75
17	141	141	139.75
18	147	147	145.75
19	153	153	151.75
20	159	159	157.75
21	165	165	163.75
22	171	171	169.75
7	177	177	175.75
8	183	183	181.75
9	189	189	187.75
10	195	195	193.75
11	201	201	199.75
12	207	207	205.75
13	213	213	211.75
23	219	219	217.75
24	225	225	223.75
25	231	231	229.75
26	237	237	235.75
27	243	243	241.75
28	249	249	247.75
29	255	255	253.75
30	261	261	259.75
31	267	267	265.75
32	273	273	271.75
33	279	279	277.75
34	285	285	283.75
35	291	291	289.75
36	297	297	295.75
37	303	303	301.75
38	309	309	307.75
39	315	315	313.75
40	321	321	319.75
41	327	327	325.75
42	333	333	331.75
43	339	339	337.75
44	345	345	343.75
45	351	351	349.75
46	357	357	355.75
47	363	363	361.75
48	369	369	367.75
49	375	375	373.75
50	381	381	379.75
51	387	387	385.75
52	393	393	391.75
53	399	399	397.75
54	405	405	403.75
55	411	411	409.75
56	417	417	415.75
57	423	423	421.75
58	429	429	427.75
59	435	435	433.75
60	441	441	439.75
61	447	447	445.75
62	453	453	451.75

EIA Chan.	Standard CATV	Incremental (IRC)	Harmonic (HRC)
63	459	459	457.75
64	465	465	463.75
65	471	471	469.75
66	477	477	475.75
67	483	483	481.75
68	489	489	487.75
69	495	495	493.75
70	501	501	499.75
71	507	507	505.75
72	513	513	511.75
73	519	519	517.75
74	525	525	523.75
75	531	531	529.75
76	537	537	535.75
77	543	543	541.75
78	549	549	547.75
79	555	555	553.75
80	561	561	559.75
81	567	567	565.75
82	573	573	571.75
83	579	579	577.75
84	585	585	583.75
85	591	591	589.75
86	597	597	595.75
87	603	603	601.75
88	609	609	607.75
89	615	615	613.75
90	621	621	619.75
91	627	627	625.75
92	633	633	631.75
93	639	639	637.75
94	645	645	643.75
100	651	651	649.75
101	657	657	655.75
102	663	663	661.75
103	669	669	667.75
104	675	675	673.75
105	681	681	679.75
106	687	687	685.75
107	693	693	691.75
108	699	699	697.75
109	705	705	703.75
110	711	711	709.75
111	717	717	715.75
112	723	723	721.75
113	729	729	727.75
114	735	735	733.75
115	741	741	739.75
116	747	747	745.75
117	753	753	751.75
118	759	759	757.75
119	765	765	763.75
120	771	771	769.75
121	777	777	775.75
122	783	783	781.75
123	789	789	787.75
124	795	795	793.75
125	801	801	799.75
126	807	807	805.75
127	813	813	811.75
128	819	819	817.75
129	825	825	823.75
130	831	831	829.75
131	837	837	835.75
132	843	843	841.75
133	849	849	847.75
134	855	855	853.75
135	861	861	859.75

Limited Warranty

R.L. DRAKE LLC warrants to the original purchaser this product shall be free from defects in material or workmanship for three (3) years from the date of original purchase.

During the warranty period the R.L. DRAKE LLC or an authorized Drake service facility will provide, free of charge, both parts and labor necessary to correct defects in material and workmanship. At its option, R.L. DRAKE LLC may replace a defective unit.

To obtain such a warranty service, the original purchaser must:

- (1) Retain invoice or original proof of purchase to establish the start of the warranty period.
- (2) Notify the R.L. DRAKE LLC or the nearest authorized service facility, as soon as possible after discovery of a possible defect, of:
 - (a) the model and serial number,
 - (b) the identity of the seller and the approximate date of purchase; and
 - (c) A detailed description of the problem, including details on the electrical connection to associated equipment and the list of such equipment.
- (3) Deliver the product to the R.L. DRAKE LLC or the nearest authorized service facility, or ship the same in its original container or equivalent, fully insured and shipping charges prepaid.

Correct maintenance, repair, and use are important to obtain proper performance from this product. Therefore carefully read the Instruction Manual. This warranty does not apply to any defect that R.L. DRAKE LLC determines is due to:

- (1) Improper maintenance or repair, including the installation of parts or accessories that do not conform to the quality and specifications of the original parts.
- (2) Misuse, abuse, neglect or improper installation.
- (3) Accidental or intentional damage.

All implied warranties, if any, including warranties of merchantability and fitness for a particular purpose, terminate three (3) years from the date of the original purchase.

The foregoing constitutes R.L. DRAKE LLC's entire obligation with respect to this product, and the original purchaser shall have no other remedy and no claim for incidental or consequential damages, losses or expenses. Some states do not allow limitations on how long an implied warranty lasts or do not allow the exclusions or limitation of incidental or consequential damages, so the above limitation and exclusion may not apply to you.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state. This warranty shall be construed under the laws of Ohio.



R.L. DRAKE HOLDINGS, LLC

Sales and Service: **800-523-6049** • Fax: **732-679-4353**

www.rldrake.com